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How many emergency physicians does Korea need?

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Purpose: This research used mathematical modeling to project the supply and demand of emergency physicians over the next decade in Korea.

Methods: A model was used to project the annual emergency physicians (EP) workforce supply and demand through the year 2015. The mathematical equations used were as follows: Supply = number of emergency physicians at the beginning of the year plus annual residency graduates minus annual attrition; Demand formula I = 5.29 full-time equivalent positions/emergency department (ED) × the number of hospital EDs, Demand formula II = annual ED visits/(4,700visits/EP/year), Demand formula III = (11 to 16 EP per major referral ED) + (6 to 8 EP per urban district/regional hospital ED).

Results: While the most conservative demand projection was 1,505 EPs in the year 2015, the most aggressive supply estimate with a yearly supply of 120 new EPs and a 1% attrition rate was 1,362 EPs in that year.

Conclusions: In Korea, emergency physicians will remain in short supply for the next ten years, even at the present levels of EM residency output.

Key Words: Manpower, Residency, Emergency medicine

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4가

16 가 .

가 1 , 2

93

51 가 319 , (2004 12)¹⁾.

가 가 24 가

4 2 , 2 4 , 2

가 . 2004 11 2005 3 가 92 29 (32%)가

3 24 58% 1995

2005 414 () 481

414

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: 2005 8 10 , 1 : 2005 9 7

: 2005 11 1

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1.

1)

1997	Haase	118
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9.7 가 3

5.7 가

3) 1999 Moorhead 4) 940

7.85 가

13.57 , 가

4.74

40

5.29 가

15,000

51

430

 $430 \times 5.29 =$

2274.7, 2,275

2)

2003 AMWAC (Australian Medical Workforce Advisory Committee)

major referral ED 30 , urban district ED

76 , rural/regional hospital ED 45 , private
hospital ED 23

major referral

ED 11 ~ 16 , urban district ED rural/regional
hospital ED 6 ~ 8 가

5) . major referral ED

16 11 ~ 16 , urban

district ED rural/regional hospital ED

2 93 ,

319 6 ~ 8 가

Table 1. Emergency medicine trainee, 1996 to 2005

	Quota	Year 1	Year 2	Year 3	Year 4	Total
1996	72	72	-	-	-	72
1997	53	53	40	24	20	137
1998	54	54	32	44	28	158
1999	65	59	32	37	43	171
2000	81	81	32	36	33	182
2001	102	75	58	33	34	200
2002	104	61	73	58	32	224
2003	105	76	54	71	60	261
2004	105	78	74	52	71	275
2005	126	109	79	76	53	317

Source: The Korean Society of Emergency Medicine

$$(11 \sim 16) \times 16 + (6 \sim 8) \times 414 = 2,660 \sim 3,568$$

가

3)

$$(317/4=79.25)$$

80

1993 Graff ⁶⁾

가

2.5

2005

1

126

120

, 40 , 1 47 , 2가 가 .

1 4,700

가

1

3)

$$100,000,000/4,700=21,277$$

1%

2004

15% ⁷⁻¹¹⁾ 1978 19887,074,378 ¹⁾

1,635

$$7,074,378/4,700=1505.1, \quad 1,505$$

1% ⁷⁾

(American Medical Association)가

2.

2~3% ⁸⁾ 가

1) 2005

12% 15% ⁹⁻¹¹⁾

2005

2005

가

2001

414

2)

0.7% 가 ¹²⁾

2005

1

126

76

1995

가 30~40 가

가

가

(Table 1).

0.7%

1%

가

3%

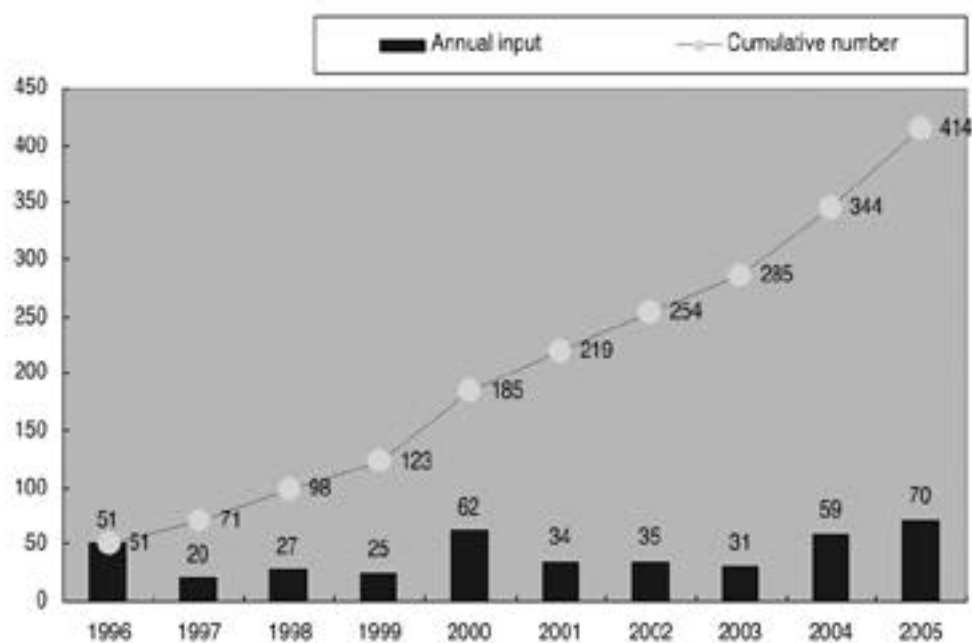


Fig. 1. The cumulative number of board certified emergency physicians in Korea (1996~2005).

가 80 120 가 , Fig. 2, scenario #2) 984 .
 1% 3% 가 47가 가 120 1%
 2005 2025 (Table 2, Fig. 2, scenario #3) 2015
 1,362 , 가 120
 가 80 1% (Table 2, 3% (Table 2, Fig. 2, scenario #4)
 Fig. 2, scenario #1) 2015 1,130 1,200 .
 , 80 3% (Table 2,

Table 2. Estimated number of emergency physicians at the end of each year, 2005 to 2025

	Scenario #1		Scenario #2		Scenario #3		Scenario #4	
	Annual supply	Total supply	Annual supply	Total supply	Annual supply	Total supply	Annual supply	Total supply
2005		414		414		414		414
2006	53	462	53	453	53	462	53	453
2007	76	533	76	513	76	533	76	513
2008	79	606	79	574	79	606	79	574
2009	109	708	109	663	109	708	109	663
2010	80	780	80	721	120	819	120	759
2011	80	851	80	777	120	930	120	853
2012	80	922	80	831	120	1,040	120	944
2013	80	992	80	884	120	1,148	120	1,032
2014	80	1,061	80	935	120	1,255	120	1,117
2015	80	1,130	80	984	120	1,362	120	1,200
2020	80	1,463	80	1,211	120	1,877	120	1,579
2025	80	1,779	80	1,405	120	2,367	120	1,904

Formula: total supply=(ex-total supply+annual supply) × (1-attribution rate)

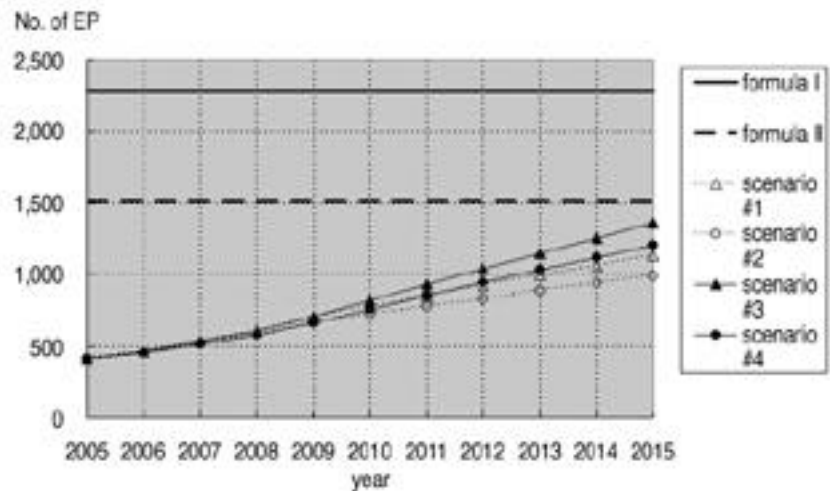


Fig. 2. Supply and demand projection of board-certified emergency physicians in Korea from 2005 to 2015.

Formula I: 5.29 X No. of EDs
 Formula II: annual ED visit/4,700
 Scenario #1: annual 80 new EP, 1% attrition rate
 Scenario #2: annual 80 new EP, 3% attrition rate
 Scenario #3: annual 120 new EP, 1% attrition rate
 Scenario #4: annual 120 new EP, 3% attrition rate

2025 2,367 (Table 2, Fig. 2, scenario #3). 2003 646 2004 430
1,505 ~ 2,275 가 10

2001 가 2000 가
12)가 185 2015 840 가 21), 22,23)
85%() 가 가 (104) 65 7% 14%
0.7% 가 115 가
24 가 7.2%
2000 2019 14.4%가 2026 20.0%가
7 24)

2015 817 1,702 가
3 10 가
8.8 가 가
가
가

15) 2003 16) 98.9

가 10 2015 984 , 1,362
가 가 1,505 , 2,275

Table 3. Factors affecting the future demand for specialist services

Aging of the population and the burden of disease
Ethnic composition
Government spending on health
Uninsured
Birth rate
Technology
System trend
Geographic variation
Personal income
Information
Non-physician clinicians

가
(Table 3).
가
18-20) 가

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